

Modeling and Gaming Proposal
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Very Rough Draft

Terminology

For convenience, I will refer to the scenarios as:

DOI early/late
Users early/late
Enviro early/late

Methodology

- 1) Define prescriptive baselines for each scenario
- 2) Define regulatory assets and liabilities. This may not be good terminology. But the point is there is a class of regulatory rights and responsibilities that fall somewhere between prescriptive standards and EWA assets. For example, the DOI and enviro scenarios include discretionary b(2) water. This is water that is flexible like the EWA, but does not require reimbursement. The DOI and user scenarios make VAMP into a prescriptive standard, but would pay for the impacts through b(2) or the EWA. Since these aren't really assets, we can't put them there. Instead, I have broken them out separately.
- 3) Define assets in enough detail for modeling and/or gaming. We cannot game during this first round using a long and intricate asset list. Major and well defined assets should probably be used for gaming at first. We can then add other assets as they become developed.
- 4) Define sharing formulas in enough detail for gaming. Need to resolve whether and how to distinguish between CVP and SWP. "Project" assets really are given to CVP or SWP, but not both in common, unless we simply want to use the COA for distributing benefits.
- 5) Define targets. Each set of scenarios (early/late) should seek to hit the same eco/supply/wq targets.
 - a) Preliminarily, I suggest for the early scenarios
 - i) Eco: Roughly as effective as FWS prescriptive standards. Since we have already concluded that previous games roughly met this criterion, the problem becomes one of meeting flow and diversion patterns of the previous set of games. This information could be compiled for easy reference by Russ and even inserted into the daily model. We also need some kind of target for upstream improvement - e.g., meeting 50% of needed ERP flows.
 - ii) Supply. Accord + upstream AFRP + 200 kaf. This will have to be a post hoc analysis. Modeled supplies + some estimate of additional supplies due to non modeled, but gamed, assets + additional water purchases. Since it unlikely

that we will meet this target through gaming alone, the question becomes simply how much additional water purchases (or other water acquisition) will be required.

- iii) Water Quality. Needs further thought. Is the baseline the Accord? Or the Accord + b(2) (in which case it varies by legal theory)? D1485 (which allows us to take credit for major improvements caused by the Accord). The gaming scenario will come up with a water quality change. But we can also take credit for non modeled actions, such as discharge management. Also, EWA cannot be forced to mitigate for operational decisions made by the Projects. If CCWD is insisting on more improvement than other Project interests, can we deal with them separately using an EBMUD exchange (apparently they are already negotiating in secret. This implies to me that CCWD wants to push CALFED to provide quality benefits, then will do an EBMUD deal separately to get even more. Not sure this is fair to the CALFED process).
- b) For the late scenarios:
 - i) Eco: Same, but lower reliance on water purchases. The habitat restoration program will continue to provide non water improvements over this time.
 - ii) Water supply. Same but 400 kaf, not 200 kaf.
 - iii) WQ. ??
- 6) Use DWRSIM to model prescriptive standards + water user assets capable of being modeled. This creates a baseline for gaming and (in some cases) represents a rough estimate of Project exports and water quality.
- 7) For the DOI scenarios, do a companion run using D 1485 standards (etc.) to estimate the amount of b(2) consumed each year in meeting the federal share of the Accord standards.
- 8) For all scenarios, perform at least 1 and perhaps more than one run to estimate the range of impacts possible from the Trinity decision. This data will modify Project export estimates and will change the inputs into Russ's daily model.
- 9) Game each scenario, beginning with the set of three early scenarios.
 - a) Game the 1981 -- 1995 sequence if we can. Otherwise, use the 1991 -- 1995 sequence.
 - b) Modify JAS model inputs to conform to DWRSIM inflows (this step is debatable)
 - c) Enviro team uses EWA assets to meet EWA goals (these targets require refinement. Remember that we are trying to meet ERP flows, for example). May want to assign responsibility for upstream ops to separate person
 - d) Listed tools may be inadequate to meet targets. If we can identify problems within the game, then we would immediately assume that other assets are available (e.g., transfers or other purchases). Otherwise, we would add assets in the post hoc analysis (see below).
 - e) CVP operators use CVP gaming assets to improve supplies
 - f) SWP operators use SWP gaming assets to improve supplies.
 - g) Run a post hoc analysis to show how far we are from meeting the three targets.
 - h) Assume that we will purchase enough water to meet the targets.
- 10) Analyze the scenarios: Since we met all targets, the question is one of cost and feasibility.

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- a) How much water was purchased for each target? Our goal should probably be to divide the assets so that post hoc purchases are approximately equal for eco and supply. Count efficiency improvements as real water.
- b) Calculate costs incurred in the game by asset and by beneficiary.
- c) Do sensitivity analysis on Trinity. I am hoping that we can do this without entirely new games. Rather, we would see how the changed inflow assumptions change things, then recalculate the purchase patterns (if the perturbation is too large, this won't work).
- d) Develop proposals for new gaming: may involve:
 - i) Changing asset list
 - ii) Changing sharing formulas
 - iii) Changing baselines
 - iv) Substituting actions that meet targets with less water. (e.g., do Clifton Court Screens allow the EWA to meet targets with less water. Fund more efficiency?)

Critical Path

- 1) Define prescriptive baselines to make them modellable. We can probably do this today. Need to bring George Barnes into it once we have a general idea.
- 2) Define assets in a way that is modellable or gameable. In many cases, this has been done, or could be done quickly. May have to make some guesses. Would be good to have made progress on this for tomorrow, at least to the point that the CT has a format and can just fill in the blanks (or can confirm/ refine guesses already made).
- 3) Define sharing formulas. This is more difficult. I would try to get a rough concurrence within CT, then fill out on Friday.
- 4) With these three, we could then request DWRSIM/ CALSIM runs
- 5) With the CALSIM runs (or even without them), we should then do a rough cut run for the 1981 – 1995 game using one of the scenarios – probably the DOI early scenario. We will need the agency biologists, project operators, etc. but should try to keep the number to a minimum. This run gives us the ability to effectively create a set of operational targets for each month of the 15 year sequence. We can then use these operational targets in other scenarios to assure consistency.
- 6) We may need to create a “hand” accounting system to assure that we are capturing all the information.
- 7) Next, run the three early scenarios
- 8) Next, perform sensitivity analysis on Trinity. For the most part, we should try to using the existing scenario runs as the bases for this run and simply look at the perturbation.
- 9) Repeat for the late scenarios.

Problems/ Possible Additions

The approach defined above differs from earlier gaming in two respects:

- Water purchases are broken into two categories: well defined transfers (e.g., Kern consortium) and unsubstantiated transfers, as needed to achieve the objectives. The use of unlimited amounts of unsubstantiated transfers to balance the books is similar to magic water. Presumably if the amount of assumed purchases rises above the level considered credible, then some other action must be taken to bolster the scenario.
- At this point, there is no cost accounting proposed during the gaming. The EWA is not on a budget. Inasmuch as there are no constraints on actions taken to meet enviro and water user targets during the game, the use of a budget may not be necessary. However, at the least, we will need to perform some sort of post hoc cost analysis to see what this all cost. This implies that we will need to estimate some sort of supply cost curve for water acquisitions, as well as estimate the cost of other actions.

Also, it is not worth gaming every little tool. We may need to simply note where additional water is needed, then see whether additional tools (other than water purchases) may help meet the need.

Specific Proposal

- 1) Prescriptive Baselines
 - a) DOI Baseline
 - i) Accord Standards
 - ii) Any hardwired ESA stds (if any)
 - iii) Current COE
 - b) User Baseline
 - i) Accord Standards
 - ii) 1995 Biological Opinions
 - iii) Upstream ESA/b(2) actions from 1994
 - iv) Current COE
 - c) Enviro Baseline
 - i) Accord Standards
 - ii) Modellable current biological opinions
 - iii) Current COE
- 2) Regulatory Environmental Assets and Liabilities
 - a) DOI Baseline
 - i) Asset: 800 kaf – CVP share of Accord stds in each year – any hardwired ESA measures chargeable to b(2).
 - ii) Liability: Any ESA take reductions will be paid for out of b(2) and/or EWA
 - iii) Liability: VAMP export reductions
 - iv) Liability?: Trinity (unclear on whether b(2)/ EWA must compensate for this).
 - b) User Baseline
 - i) Liability: Any ESA take reductions will be paid for out of EWA
 - ii) Liability: VAMP export reductions
 - iii) Liability: Trinity
 - c) Enviro Baseline
 - i) Asset: 800 kaf per year
 - ii) Asset: ESA take restrictions

- iii) Liability?: VAMP export reductions
iv) [Trinity an impact on the Projects]

3) Assets

I have not included tools that are very small or which cannot be modeled or gamed easily. In particular, we need to include the benefits of some of the water quality tools in the analysis.

Asset	Operational Definition
Kern Consortium Water Purchase	90 kaf in wet years 70 kaf in above normal years 50 kaf in below normal years 100 kaf dry/ critical years (for first 2 years of drought).
Vidler	50,000 af groundwater storage space. 10 kaf/m in/out
Semitropic	100 kaf groundwater storage space. 20 kaf/m in/out
MWD source shift	60 kaf. 20 kaf/m generation spring/summer. Must repay by Jan 1.
Other Market Purchases of Water	As needed during game.
Feather River Reoperation	20-30 kaf per year yield.
Shasta Flashboards	50 kaf capacity. Model this when part of User Share
E/I Variances	Intrusions into this standard are allowed. Control is defined as part of each scenario.
Increase Banks Pumping Capacity	COE Banks limit raised from current levels to: 8.5 kcfs year round 6.6 + 1/3 SJR November – March
Prioritization for unused Project pumping capacity	Includes JPOD and EWA access to Banks and Tracy
Access to unused CVP/ SWP storage capacity	San Luis + upstream reservoirs + other reservoirs. Incorporates pumping to storage, reservoir reoperation to optimize storage space.
Access to unused non-project storage capacity	Castaic, Eastside. Requires capacity.
Access to unused stored water	Loans of stored water between the Projects and EWA. Allowed based upon explicit collateral (i.e., undefined water purchase rights do not represent collateral)
EWA Funding	Based upon estimate of need
DMC/ CA Aq. Intertie	400 cfs capacity increases project flexibility
Delta Cross Channel Ops	Operate to improve export water quality
CVPLA: Shifting refuge supplies	Diversify sources of water for refuges. Borrow acquired refuge water for EWA; use refuges as small-scale

Asset	Operational Definition
	storage projects; increase efficiency of conveyance.

Sharing

Sharing of some assets will shift according to the baselines chosen. Other assets have sharing that does not change. We will need to determine whether Project Assets must be given to the SWP and CVP individually, or simply to the Projects.

Asset/ Liability	DOI Baseline: Sharing	Users Baseline: Sharing	Enviro Baseline: Sharing
Kern Consortium Water Purchase	Wet year purchase to EWA. Dry year purchase to CVP	EWA	CVP
Vidler	CVP	EWA	CVP
Semitropic	CVP	EWA	CVP
MWD source shift	Equal option	EWA	Users
Other Acquisitions (Markets, local storage, etc.)	As needed by any user to meet targets	As needed by any user to meet targets	As needed by any user to meet targets
Feather River Reoperation	SWP	EWA	SWP
Shasta Flashboards	CVP	EWA	CVP
E/I Variances	EWA	EWA	EWA
Flex other Stds	EWA may relax any hardwired BO stds.	EWA may relax any hardwired BO stds.	
Increase Banks Pumping Capacity	SWP, except EWA in April-May	SWP, except EWA in March - June	SWP
Prioritization for unused Project pumping capacity	JPOD has priority, except that EWA may cut surplus deliveries through JPOD without cost.	EWA has priority for Banks, but cannot veto CVP use for remaining surplus without compensation	JPOD has absolute priority.
Access to unused CVP/ SWP/ EWA storage capacity	On a no harm basis	On a no harm basis	On a no harm basis
Access to unused non-project storage capacity	On a no harm basis	On a no harm basis	On a no harm basis

Asset/ Liability	DOI Baseline: Sharing	Users Baseline: Sharing	Enviro Baseline: Sharing
Access to unused stored water	Based on collateral	Based on collateral	Based on collateral
EWA Funding Needs	Post hoc analysis	Post hoc analysis	Post hoc analysis
Water Supply Funding Needs	Post hoc analysis	Post hoc analysis	Post hoc analysis
DMC/ CA Aq. Intertie	CVP	EWA	CVP
Delta Cross Channel Ops	As needed for WQ	As needed for WQ	As needed for WQ
CVPIA: Shifting refuge supplies	Dealt with under priority for unused project capacity?	Dealt with under priority for unused project capacity?	Dealt with under priority for unused project capacity?